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EXAMINER	
LEGASSE JR, FRANCIS M	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/566,946	KIM ET AL.	
	Examiner	Art Unit	
	Francis M. LeGasse Jr	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *32-37,41,43,44,46-50,72-75,81,88,120 and 129* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *32-37,41,43,44,46-50,72-75,81,88,120 and 129* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3 February 2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims Status

Claims 1-31,38-40, 42, 45, 51-71,76-80, 82-87, 89-I 19, 121-128 and 130-133 are cancelled.

Claims 46, 50, 75, 120 and 129 are amended.

Claims 32-37, 41, 43-44, 46-50, 72-75, 81,88, 120 and 129 are pending.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 32, 33, 43, 48 and 72-74 are rejected under 35 U.S.C. 102(b) as being anticipated by Ebbesen et al. (US Patent No. 5,973,316, "Ebbesen", hereinafter).

Regarding claims 32 and 72, Ebbesen *(figures 1, 2 and 7)* discloses a wavelength separation device comprising:

- a metal film (10) or a plurality of metal islands having a plurality of openings (12) having a width (d) that is less than at least one first predetermined

wavelength of incident radiation to be provided onto the film or the islands; (col. 4, lines 17-20)

- wherein: the metal film (10) or islands are configured such that the incident radiation is resonant with at least one plasmon mode on the metal film (10) or metal islands (col. 4, lines 53-61) ;
- and transmission of radiation having at least a second peak wavelength and a third peak wavelength different from the second peak wavelength is enhanced through the plurality of openings in the metal film or the plurality of metal islands due to the resonance with the at least one plasmon mode (col. 4, lines 62-67).

Regarding claim 33, Ebbesen *(figures 1, 2 and 7c)* discloses a wavelength separation device further wherein:

- the metal film (10) or metal islands comprise at least two cells (12);
- a first period of first openings in the first cell is different than a second period of second openings in a second cell; (col. 4, lines 42-47) and
- a transmission of the radiation having the second peak wavelength through the first openings in the first cell is enhanced due to the first period; and a transmission of the radiation having the third peak wavelength through the second openings in the second cell is enhanced due to the second period. (col. 4, lines 52-67).

Regarding claim 43, Ebbesen *(figures 1, 2 and 7c)* a spectrum analyzer comprising:

- a plurality of self-assembled metal islands (material between the holes (12)) on the substrate;

Regarding claim 48, Ebbesen *(figures 1, 2 and 7c)* a spectrum analyzer comprising :

- the device of claim 32 (see rejection above)
- a photo-detector (78)

Regarding claim 73, Ebbesen *(figure 7c)* discloses a wavelength separation device further comprising

- separately detecting (78) each transmitted radiation pass band.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 34, 35, 37, 41, 44, 49, 50, 75, 81 and 120 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebbesen.

Regarding claim 34, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising the metal film or islands comprises at least ten cells (12) and that period of opening in each of the cells may different (col. 4, lines 45-47) but fails to explicitly teach that the cells have a period of opening different from each other and transmission of the radiation having a different peak wavelength through openings in each cell is enhanced due to the period of the openings in the respective cell.

It is common knowledge in the art to design the period of the cells to be different from each.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a specific period for each of the cells in the device of Ebbesen because it will provide precise control over the wavelength that pass through by ensuring that each cell has a specific period.

It is common knowledge in the art that the period of the individual cells will affect the peak wavelength of the incident light.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use periods of individual cells to cause different peak wavelengths in the device of Ebbesen because it provides a means for effectively controlling and adjusting the frequencies of the light that pass through the device.

Regarding claim 74, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising:

- a radiation transparent substrate (col. 4, lines 9-10);
- and a plurality of metal strips (material between the holes (12)) on the substrate;
- wherein: adjacent metal strips are separated by a distance that is less than at least one first predetermined wavelength of incident radiation to be provided onto the device (col. 4, lines 53-61); and
- the metal strips are configured such that the incident radiation is resonant with at least one plasmon mode on the metal strips, thereby enhancing transmission of radiation having at least one second peak wavelength between the plurality of metal strips (col. 4, lines 62-67).

Ebbesen fails to teach that the plurality of metal strips are metal islands.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a plurality of metal islands in the device of Ebbesen because it will ensure that there is separation between the metal strips, thus reducing the amount of cross talking that may occur.

Regarding claim 35, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising the metal film or islands comprises at least ten cells (12) and that period of opening in each of the cells may be different (col. 4, lines 45-47) but fails to explicitly teach that the metal film or islands comprise at least thirty cells; a transmission of the radiation having a different peak wavelength through openings in each cell is

enhanced due to the period of the openings in the respective cell and radiation transmitted through each cell has a peak wavelength that differs by at least 10 nm from peak wavelengths of radiation transmitted through the other cells.

It is common knowledge in the art to use a plurality of cells such as thirty.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a plurality of cells in the device of Ebbesen because it will enhance the emitted light because of the greater number of cells.

It is common knowledge in the art that the period of the individual cells will affect the peak wavelength of the incident light.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use periods of individual cells to cause different peak wavelengths in the device of Ebbesen because it provides a means for effectively controlling and adjusting the frequencies of the light that pass through the device.

It is common knowledge in the art that the size of the cells determines the peak wavelength that will pass through.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use specific cell dimensions that will provide specific peak wavelengths in combination with the device of Ebbesen because it will enhance and improve the control over the device by allowing a precise peak wavelength to pass through.

Regarding claim 37, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising the metal film (10) or islands wherein a period of openings in each

cell ranges from about 250 nm to about 700 nm and a width of each opening ranges from about 20 nm to about 80 nm (col. 4, lines 45-48).

Regarding claim 41, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising the metal film or islands comprises at least ten cells (12) and that period of opening in each of the cells may be different (col. 4, lines 45-47) but fails to explicitly teach the that openings comprise slits located in the metal film, the slits having a length that is at least ten times larger than the width.

It is common knowledge in the art to have a specific shape and dimension to the holes or slits in the metal film

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a specific shaped slit and dimension in the metal film of Ebbesen because it will provide the ability to control the wavelength that passes through the device.

Regarding claims 44 and 81, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising the metal film or islands comprises at least ten cells (12) and that period of opening in each of the cells is different than the periods of openings in each of the other cells (col. 4, lines 45-47) but fails to explicitly teach that the plurality of metal islands are located on a plurality of ridges on the transparent substrate.

It is common knowledge in the art to position the metal film or metal islands on a plurality of surfaces such as a ridge.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to position the metal film or metal islands on a specific surface of

the device of Ebbesen because it will provide maximum control to the design thus providing a wide range of configuration that may be used.

Regarding claim 49, Ebbesen *(figures 1, 2 and 7c)* a spectrum analyzer comprising the device of claim 32 and a photo-detector (78) without the use of utilizing diffractive optics but fails to teach that the photo-detector comprises a CCD array, a CMOS active pixel array or a focal plane array optically coupled to the metal film or the metal islands.

It is common knowledge in the art to use a CCD array or CMOS array or focal plane array optically coupled to a device.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a specific type of detector in the device of Ebbesen because they are common in the art and they provide a means for accurately acquiring an image.

Regarding claim 50, Ebbesen *(figures 1, 2 and 7c)* a spectrum analyzer comprising a photo-detector (78) is optically coupled with the wavelength separation device and is adapted to detect a radiation transmitted through the wavelength separation device, the transmitted radiation having a range of peak wavelengths enhanced by resonance with a plasmon mode on the metal film or metal islands of the wavelength separation device (col. 4, lines 62-67; col. 5, lines 1-7).

Regarding claim 75, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising the metal film or islands comprises at least ten cells (12) and that the array of transparent regions between the plurality of metal islands have a period, a_o, such that the transmission of the radiation between the plurality of metal islands is

enhanced due to the period of the array of transparent regions but fails to explicitly teach that the first and second wavelengths are 700 nm or less and the adjacent islands are separated by less than 100 nm, that the openings comprise slits located in the metal film, the slits having a length that is at least ten times larger than the width and the period, a_o, is about 200 to about 700 nm for visible incident radiation.

It is common knowledge in the art to have a specific shape and dimension to the holes or slits in the metal film.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a specific shaped slit and dimension in the metal film of Ebbesen because it will provide the ability to control the wavelength that passes through the device.

Ebbesen fails to explicitly teach that the first and second wavelengths are 700 nm or less and the adjacent islands are separated by less than 100 nm and the period, a_o, is about 200 to about 700 nm for visible incident radiation.

It is common knowledge in the art to use a specific separation distance and period between the adjacent islands.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a specific separation distance and period in the device of Ebbesen because it will permit a specific wavelength to pass through thus providing precise control to the user.

Regarding claim 120, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising the metal film or islands comprises at least ten cells (12) and that

period of opening in each of the cells is different than the periods of openings in each of the other cells (col. 4, lines 45-47) but fails to teach that the width of the transparent regions at their narrowest point ranges from about one to about three penetration depths of surface plasmon fields in the metal islands which incident radiation is provided on the metal islands.

It is common knowledge in the art for penetration depths to vary depending on the width of the region.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a specific penetration depth for the width of the cells in the device of Ebbesen because it will provide precise control over the wavelengths that pass through, thus improving the accuracy and control of the device.

Claims 36 and 88 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebbesen in view of Blasing (US Patent No. 5,455,594, "Blasing").

Regarding claim 36, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising the metal film or islands comprises at least ten cells (12) and that period of opening in each of the cells is different than the periods of openings in each of the other cells (col. 4, lines 45-47) but fails to explicitly teach that the period of openings across the metal film or metal islands is chirped.

Blasing *(figures 3b and 4)* discloses a wavelength separation device wherein the period of openings across the metal film or metal islands (40) are chirped (col. 9, lines 5-10)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the chirped metal films or metal islands of Blasing in combination with the wavelength separation device of Ebbesen because, in col. 3, lines 55-61, Blasing discloses that the chirped films or islands offer a broader range of rejected wavelengths than do previously known multilayers.

Regarding claim 88, Ebbesen *(figure 7c)* discloses a wavelength separation device comprising the metal film or islands comprises at least ten cells (12) and that period of opening in each of the cells is different than the periods of openings in each of the other cells (col. 4, lines 45-47) but fails to teach that the plurality of metal islands are not connected to each other.

Blasing *(figure 4)* discloses a wavelength separation device comprising a plurality of metal islands (40) that are not connected to each other.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the plurality of metal islands of Blasing because they are completely isolated from each other, thus ensuring the quality and accuracy of the device.

Claims 46, 47 and 129 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ebbesen in view of Thio et al. (US 2003/0173501 A1, "Thio", hereinafter).

Regarding claim 46, Ebbesen *(figures 1, 2 and 7)* discloses a wavelength separation device comprising a metal film (10) or a plurality of metal islands having a plurality of openings (12) having a width (d) that is less than at least one first

predetermined wavelength of incident radiation to be provided onto the film or the islands and that the metal film or islands are configured such that the incident radiation is resonant with at least one plasmon mode on the metal film or metal islands (col. 4, lines 17-20 lines 53-61) but fails to teach that the device comprises an N channel monochromator having N cells, where N is an integer between 10 and 10,000, each cell is about 50 to 100 microns, each cell contains at least one opening in the metal film or metal islands; and each cell is adapted to enhance transmission of radiation having a different peak wavelength than a peak wavelength of radiation transmitted through the other cells.

Thio *(figures 1, 2A and 2B)* teaches a wavelength separation device comprising an N channel monochromator having N cells, where N is an integer between 10 and 10,000, each cell is about 50 to 100 microns, each cell contains at least one opening in the metal film or metal islands ([0037], lines 26-33).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the monochromator of Thio in combination with the device of Ebbesen because it would improve the accuracy in the detection of different wavelengths.

Ebbesen as modified by Thio fails to teach that each cell is adapted to enhance transmission of radiation having a different peak wavelength than a peak wavelength of radiation transmitted through the other cells.

It is common knowledge in the art to use a monochromator to enhance transmission of radiation.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a monochromator to enhance transmission in the device of Ebbesen as modified by Thio because it will transmit a specific wavelength of light thus providing a source that can produce monochromatic light.

Regarding claim 47, Ebbesen as modified by Thio *(Thio: figures 1, 2A and 2B)* teaches a wavelength separation device comprising N channel monochromator but fails to teach that the monochromator length, width and thickness are each less than 1 cm.

It is common knowledge in the art to design a monochromator with a specific thickness.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a specific thickness for the monochromator of Ebbesen as modified by Thio because it will allow the user to provide the most compact design thus enabling the device to be used in a variety of configurations.

Regarding claim 129, Ebbesen *(figures 1, 2 and 7)* discloses a wavelength separation device comprising a metal film (10) or a plurality of metal islands having a plurality of openings (12) having a width (d) that is less than at least one first predetermined wavelength of incident radiation to be provided onto the film or the islands and that the metal film or islands are configured such that the incident radiation is resonant with at least one plasmon mode on the metal film or metal islands (col. 4, lines 17-20 lines 53-61) but fails to teach that two or more stacked metal films or two or more layers of metal islands, each metal film or layer of metal islands contains a two dimensional array of a plurality of openings having a width that is less than at least one

first predetermined wavelength of incident radiation to be provided onto the film or the islands.

Thio *(figures 1, 2A and 2B)* teaches a wavelength separation device comprising two or more stacked metal films (20a, 20b) or two or more layers of metal islands, each metal film (20a, 20b) or layer of metal islands contains a two dimensional array of a plurality of openings (30) having a width that is less than at least one first predetermined wavelength of incident radiation to be provided onto the film or the islands ([0038], lines 1-11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the stacked films of Thio in combination with the device of Ebbesen because, in [0006], Thio discloses that the apparatus enhances light transmission wherein the transmission efficiency is even further enhanced in comparison to prior art devices by optimizing the geometry of the aperture as well as The relationship between the geometry of the aperture and the geometry of the surrounding periodic surface topography.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Francis M. LeGasse Jr whose telephone number is (571) 272-9798. The examiner can normally be reached on Monday through Thursday 7:00 am to 5:30 pm E.S.T.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached on (571) 272-2328. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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